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P.01/01

# INNOLUX DISPLAY CORPORATION

## MT170EN01 V.C LCD MODULE SPECIFICATION

- ) Preliminary Specification
- ( ) Final Specification

	Customer	Checked & Approved by
,		

Approved by	-	Checked by	Prepared by				
MKT	QRA	TD	PD	MKT			
2 1089 1089	10000000000000000000000000000000000000	18 3/8·8·	度3月26日 大人文·安	颜之头冬~ 王巴起火ios 鱼象别《如'8			

## Innolux Display Corporation,

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Document Number: MT170EN01 V.C-DR4-28 (V04)



Version:04

			Record of Revision
Version	Revise Date	Page	Content
01	2007-04-25	All	First edition to all
02	2007-05-29	15/24	Modify CR from 800:1 to 1000:1
03	2007-08-23	13/24	Modify lamp voltage  Modify lamp life time from 40000Hr to 50000Hr
		20/24	Modify Module Label
		24/24	Modify two logo on the back of module
04	2008-04-15	13/24	Modify the maximum value of the lamp driving frequency from 80KHz to 60KHz
		14/24	Add the lamp Hi-POT test spec and conditions in note 5
		24/24	Label place change
		<b>C</b>	
	N		



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# A. General specification

NO.	Item	Specification	Remark
1	Display resolution (pixel)	1280(H) X 1024(V), SXGA resolution	
2	Active area (mm)	337.92(H) X 270.336(V)	
3	Screen size (inch)	17 inches diagonal	
4	Pixel pitch (mm)	0.264(H) X 0.264(V)	
5	Color configuration	R, G, B vertical stripe	
6	Overall dimension (mm)	358.5(W)x296.5(H)x16(D) (typ)	
7	Weight (g)	2000 (max)	
8	Surface treatment	Anti-glare, Haze = 25%, Hard coating (3H)	
9	Input color signal	8 bit LVDS	
10	Color saturation	72% NTSC	
11	Display colors	16.7M colors (6 bit with Hi-FRC)	
12	Optimum viewing direction	6 o'clock	
13	Backlight	4 CCFL, top & bottom edge side	
14	TCO'03 and RoHS	TCO'03 and RoHS compliance	



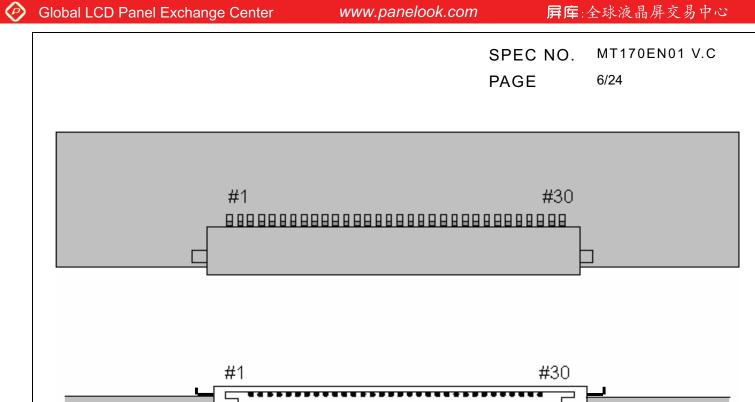
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## **B.** Electrical specifications

1.Pin assignment

Connector JAE FI-X30SSL-HF or equivalent

Pin No	Symbol	Description
1	RxO0-	LVDS Differential data input Channel 0(-)
2	RxO0+	LVDS Differential data input Channel 0(+)
3	RxO1-	LVDS Differential data input Channel 1(-)
4	RxO1+	LVDS Differential data input Channel 1(+)
5	RxO2-	LVDS Differential data input Channel 2(-)
6	RxO2+	LVDS Differential data input Channel 2(+)
7	GND	Ground
8	RxOC-	LVDS Differential Clock input (-)
9	RxOC+	LVDS Differential Clock input (+)
10	RxO3-	LVDS Differential data input Channel 3(-)
11	RxO3+	LVDS Differential data input Channel 3(+)
12	RxE0-	LVDS Differential data input Channel 0(-)
13	RxE0+	LVDS Differential data input Channel 0(+)
14	GND	Ground
15	RxE1-	LVDS Differential data input Channel 1(-)
16	RxE1+	LVDS Differential data input Channel 1(+)
17	GND	Ground
18	RxE2-	LVDS Differential data input Channel 2(-)
19	RxE2+	LVDS Differential data input Channel 2(+)
20	RxEC-	LVDS Differential Clock input (-)
21	RxEC+	LVDS Differential Clock input (+)
22	RxE3-	LVDS Differential data input Channel 3(-)
23	RxE3+	LVDS Differential data input Channel 3(+)
24	GND	Ground
25	GND	Ground
26	GND	Ground or Open
27	GND	Ground
28	VCC	Power supply (+5.0V)
29	VCC	Power supply (+5.0V)
30	VCC	Power supply (+5.0V)



Rear view of LCM



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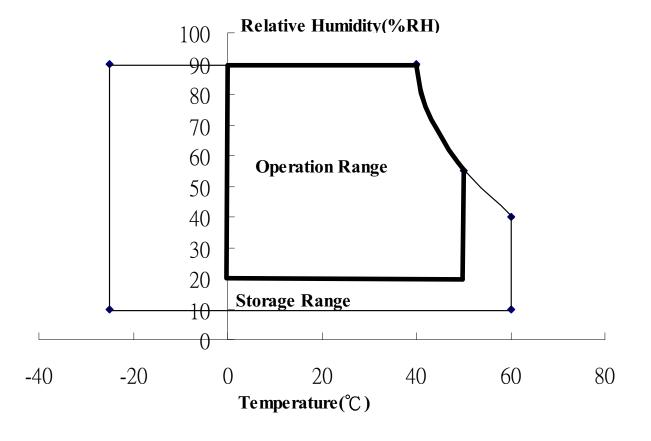
## 2. Absolute maximum ratings

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Parameter	Symbol	Val	ues	Unit	Remark
		Min. Max.			
Power voltage	V <sub>cc</sub>	- 0.3	6.0	V	At 25°C
Input signal voltage	$V_{LH}$	- 0.3	3.6	V	At 25°C
Operating temperature	Тор	0	50	°C	Note 1
Storage temperature	T <sub>ST</sub>	- 25	60	°C	Note 2
CCFL Current	ICFL	3	8	[mA] rms	

Note 1: The relative humidity must not exceed 90% non-condensing at temperatures of 40°C or less. At temperatures greater than 40°C, the wet bulb temperature must not exceed 39°C.

Note 2: The unit should not be exposed to corrosive chemicals.



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## 3. Electrical characteristics

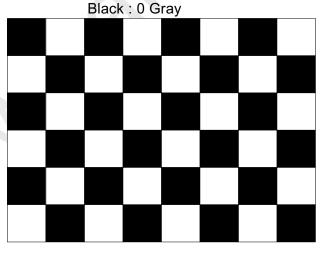
a. Typical operating conditions

	Item	Symbol	Min.	Тур.	Max.	Unit	Remark
	Input Voltage	$V_{cc}$	4.5	5.0	5.5	V	
Permiss	sive Power Input Ripple	$V_{RF}$		-	0.15	Vp-p	Note 1
	Input Current	I <sub>cc</sub>	-	0.7	0.95	Α	Note 2
Diff	erential Impedance	$Z_{m}$	90	100	110	ohm	
	Rush Current	I <sub>Rush</sub>	-	-	3.0	Α	Note 3
Logic Input	Common Mode Voltage	VCM	1.125	1.25	1.375	V	
Voltage	Differential Input Voltage	VID	250	350	450	mV	
LVDS:	Threshold Voltage (High)	VTH	-		100	mV	Note 4
IN+, IN-	Threshold Voltage (Low)	VTL	-100			mV	Note 4

Note 1: Power input ripple should not exceed max. value.

Note 2: The specified current is under the  $V_{cc}$  =5V, 25 °C,  $f_V$ =60Hz (frame frequency) condition whereas mosaic pattern (black & white [8\*6] ) is displayed.

White: 255 Gray



mosaic pattern (black & white [8\*6])

屏库:全球液晶屏交易中心

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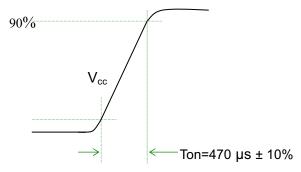
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SPEC NO.

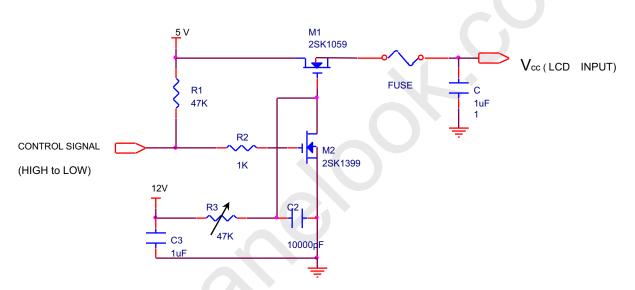
## Note 3: test condition:

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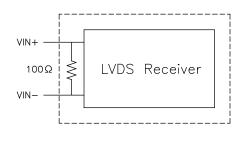
- (1)  $V_{cc} = 5 \text{ V}$ ,  $V_{cc}$  rising time = 470  $\mu$ s ± 10%
- (2) Pattern: Mosaic pattern

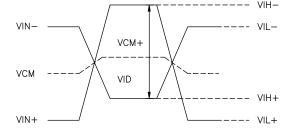


#### (3) Test circuit



Note 4: LVDS signal definition





 $VID = VIN_{+} - VIN_{-}$ 

 $\triangle$ VCM = | VCM<sub>+</sub>–VCM- | ,

VIN+ = Positive differential DATA & CLK Input VIN- = Negative differential DATA & CLK Input

 $\triangle$ VID = | VID<sub>+</sub>–VID- | ,

 $VID+ = |VIH_{+}-VIH_{-}|,$ 

 $VID- = | VIL_+-VIL- |$ ,

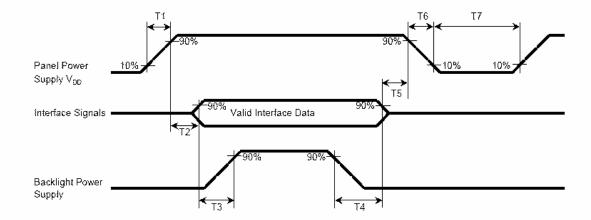
 $VCM = (VIN_+ + VIN_-)/2,$ 

 $VCM+ = (VIH_+ + VIH_-)/2,$ 

 $VCM- = (VIL_+ + VIL_-)/2,$ 

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Note 5: Power on sequence for LCD V<sub>cc</sub>



Parameter		Unit							
	Min	Тур	Max	ms					
T1	0.1		10	ms					
T2	0		50	ms					
T3	200	250		ms					
T4	100	250		ms					
T5	0	20	50	ms					
T6	0.1			ms					
T7	1000			ms					



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## b. Display color v.s. input data signals

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

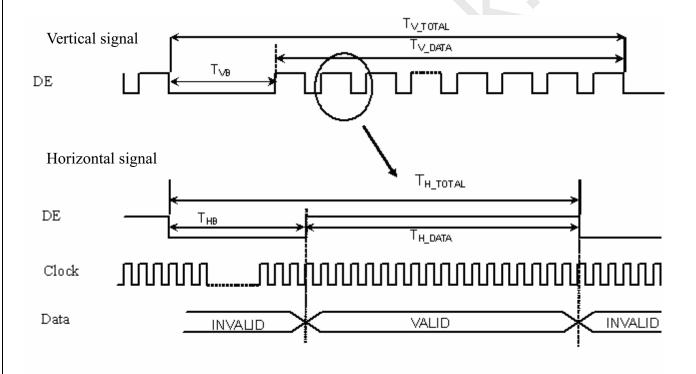
												Inp	ut (	colo	or d	lata	l								
Color		Red							Green								Blue								
		MS	B				1	L	SB	IV	ISB					L	SB	MSB			_		L	SB	
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	В7	В6	В5	В4	В3	В2	В1	В0
Basic colors	Black Red(255) Green(255) Blue(255) Cyan Magenta Yellow White	0 1 0 0 0 1 1	0 1 0 0 1 1	0 0 1 0 1 0 1	0 0 1 1 1 0	0 0 0 1 1 1 0																			
Red	Red(000) dark Red(001) Red(002) : Red(253) Red(254) Red(255) bright	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 1 : 0 1	0 1 0 : 1 0 1	0 0 0 : 0 0 0	0 0 0 . 0 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0							
Green	Green(000)dark Green(001) Green(002) : Green(253) Green(254) Green(255)bright	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 0 0	000:000	0 0 0 : 0 0	0 0 0 : 0 0	000:000	0 0 0 : 0 0	0 0 0 : 1 1	0 0 0 : 1 1	0 0 : 1 1	0 0 : 1 1	0 0 0 : 1 1	0 0 : 1 1	0 0 1 : 0 1	0 1 0 : 1 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0
Blue	Blue(000) dark Blue(001) Blue(002) : Blue(253) Blue(254) Blue(255) bright	0 0 0 : 0 0	0 0 0 : 0 0	0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 0 0	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 0 : 1 1	0 0 1 : 0 1	0 1 0 : 1 0



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## c. Input signal timing Support Input Timing Table

	Item	Description	Min.	Тур.	Max.	Unit
Clock	Dclk	period	14.71	18.52	22.22	nS
	DCIK	frequency	45	54	68	MHz
Vertical	$T_{V\_TOTAL}$	V total line number	1044	1066	1100	$T_{H\_TOTAL}$
	$T_{V\_DATA}$	Data duration	_	1024	1	$T_{H\_TOTAL}$
	$T_{VB}$	V-blank	20	42		$T_{H\_TOTAL}$
	f <sub>V</sub>	frequency	50	60	75	Hz
Horizontal	T <sub>H_TOTAL</sub>	H total pixel number	790	844	880	DClk
	T <sub>H_DATA</sub>	Data duration	_	640	(+)	DClk
	T <sub>HB</sub>	H-blank	150	204		DClk



Note: DE is reference signal, DE means the display data valid.

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## d. Display Position

D(1, 1)	D(2, 1)	 D(640, 1)	 D(1279, 1)	D(1280, 1)
D(1, 2)	D(2, 2)	 D(640, 2)	 D(1279, 2)	D(1280, 2)
:		 :	 :	:
D(1, 512)	D(2, 512)	 D(640, 512)	 D(1279, 512)	D(1280, 512)
:		 :	 :	:
D(1, 1023)	D(2, 1023)	 D(640, 1023)	 D(1279, 1023)	D(1280, 1023)
D(1, 1024)	D(2, 1024)	 D(640, 1024)	 D(1279, 1024)	D(1280, 1024)

## e. Backlight driving conditions

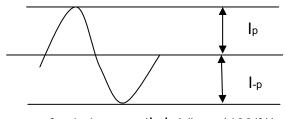
Parameter	Symbol	Min.	Тур.	Max.	Unit	Remark	Remark
Lamp voltage	VL	549	610	671	Vrms	@7mA	
Lamp operation current	IL	3	7	8	mArms	7	Note 1
Lamp starting voltage	VLstart	1040			Vrms	T = 25°C	Note 2,3,4,5
		1360				T = 0 ° C	Note 2,3,4,5
Frequency	F	40	55	60	KHZ		Note 5
Lamp life time		50000			Hr		Note 6

Note: The waveform of the voltage output of inverter must be area-symmetric and the design of the inverter must have specifications for the modularized lamp. The performance of the Backlight, such as lifetime or brightness, is greatly influenced by the characteristics of the DC-AC inverter for the lamp. All the parameters of an inverter should be carefully designed to avoid producing too much current leakage from high voltage output of the inverter. When designing or ordering the inverter please make sure that a poor lighting caused by the mismatch of the Backlight and the inverter (miss-lighting, flicker, etc.) never occurs. If the above situation is confirmed, the module should be operated in the same manners when it is installed in your instrument.

#### Note 1:

The degrees of unbalance: less than 10%

The ratio of wave height: less than  $\sqrt{2 \pm 10\%}$ 



lp: high side

I-p: low side

The degrees of unbalances = $|I_p-I_{-p}|$  /Irms \*100(%)

The ratio of wave height = Ip(or I-p)/Irms

Lamp should be completely turned on.



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Note 2:

Test equipment: AS-114B, Output Capacitor =15pF, f=46KHz

Note 3:

The voltage shown above should be applied to the lamp for more than 1 second after startup. Otherwise, the lamp may not be turned on normally.

Note 4:

Inverter should provide more than min. value, and then lamp could be completely turned on

Note 5:

Lamp frequency may produce interference with horizontal synchronous frequency and this may cause line flow on the display. Therefore lamp frequency shall be detached from the horizontal synchronous frequency and its harmonics as far as possible in order to avoid interference.

Lamp Hi-POT test spec: The current leakage should not be more than (<=) 0.8mA under the conditions of "the frequency of the inverter output voltage keeping 60Hz, test voltage keeping 2.5KV and test time keeping 2sec".

Note 6:

Lamp life definition:

The brightness of lamp becomes 50% of the initial brightness or not normal lighting.

Backlight connecter: 35001HS-02L

Pin no.	Symbol	Function	Remark
1	VIH	Lamp high voltage input	Cable color: Pink · Blue
2	VIL	Lamp low voltage input	Cable color: White · Black



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l <b>4</b>	0	Condition	Specification			11	D
Item	Symbol	Condition	Min.	Тур.	Max.	Unit	Remark
Response time	Tr			1	4	ms	Note 4
	Tf	θ= 0°		4	6		
	Tr+Tf			5	10		
Contrast ratio	CR	θ= 0°	700	1000			Note 3,5
Viewing angle	Тор	CR≧10	70	80		deg	Note 3,5,7
		CR≧5	75	85			
	Bottom	CR≧10	70	80			
		CR≧5	75	85			
	Left	CR≧10	70	80			
		CR≧5	75	85			
	Right	CR≧10	70	80			
		CR≧5	75	85			
Brightness (Center)	YL		250	300		nit	Note 3,6
	Wx		-0.03	0.313			Note 2
Color chromaticity(CIE)	Wy			0.329			
	Rx			0.640			
	Ry			0.349	+0.03		
	Gx	θ= 0°		0.284		Note 3	
	Gv			0.617			
	Bx			0.142			
	By			0.067			
White uniformity (9)	$\delta_{W}$		0.75	0.8			Note 3,8
Cross talk	Ct				2%		Note 9

Note 1: Ambient temperature = 25°C.

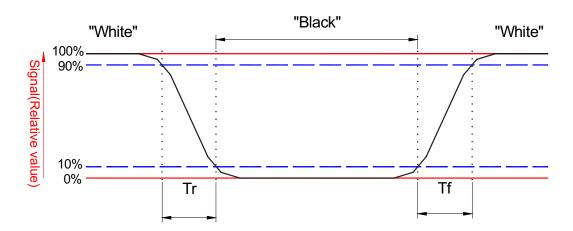
Note 2: To be measured in dark room after backlight warm up 30 minutes.

Note 3: To be measured with a viewing cone of 2°by Topcon luminance meter BM-5A.

Note 4: Definition of response time:

The output signals of BM-7 are measured when the input signals are changed from "Black" to "White" (falling time) and from "White" to "Black" (rising time), respectively. The response time interval between the 10% and 90% of amplitudes. Refer to figure as below.

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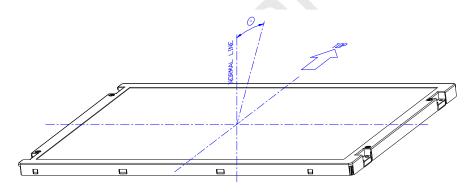
Note 5. Definition of contrast ratio:

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Contrast ratio is calculated with the following formula.

Note 6: Driving conditions for CCFL: I<sub>L</sub>= 7.0 mA, 50 KHz Frequency.

Note 7: Definition of viewing angle



Note 8: Definition white uniformity:

Luminance are measured at the following nine points (1~9).

$$\delta_{W} = \frac{\text{Minimum Brightness of nine points}}{\text{Maximum Brightness of nine points}}$$

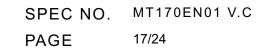
1/6 1/3

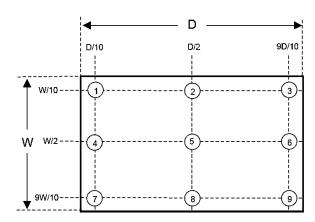
1/2

2/3

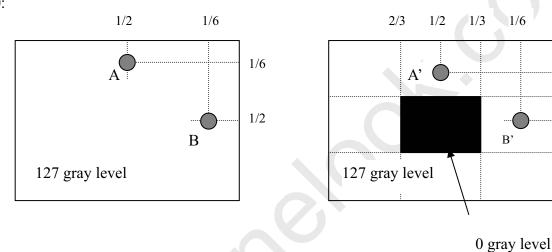
**②** 

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Note 9:

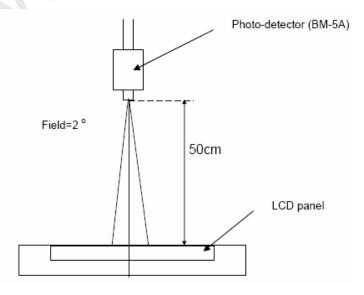


Unit: percentage of dimension of display area

 $IL_A-L_A\cdot I/L_A \times 100\% = 2\%$  max.,  $L_A$  and  $L_{A'}$  are brightness at location A and A'

I  $L_{B}$ - $L_{B'}$  I /  $L_{B}$  x 100%= 2% max.,  $L_{B'}$  and  $L_{B'}$  are brightness at location B and B'

Note 10: Optical characteristic measurement setup



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D. Reliability test items

Test Item	Test Condition	Judgement	Remark
High temperature storage	60°C, 240Hrs	Note 1	Note 2
Low temperature storage	-25°C, 240Hrs	Note 1	Note 2
High temperature & high	40°C, 90%RH,240Hrs	Note 1	Note 2
humidity operation	(No condensation)		
High temperature operation	50°C, 240Hrs	Note 1	Note 2
Low temperature operation	0°C, 240Hrs	Note 1	Note 2
Thermal Shock	-20°C~60°C	Note 1	Note 2
(non-operation)	1Hr, 10mins, 1Hr, 100cycles		
Electrostatic discharge (ESD)	Contact: +/-8kV, 150pF(330ohms),	No te 1	Note 2
(non-operation)	10 times/1 point, 1 time/1 sec		
	Air discharge: +/-15kV, 150pF(330ohms),		
	10 times/1 point, 1 time/1 sec		
Vibration	Vibration level : 1G	Note 1	Note 2
(non-operation)	Bandwidth : 10-500Hz		
	Waveform : sine wave,		
	sweep rate : 30min		
	1H for each direction X, Y, Z		
	(3Hrs in total)		
Mechanical shock	Shock level : 50G/11ms,	Note 1	Note 2
(non-operation)	Waveform : Half sine wave		
	Direction: ±X, ±Y, ±Z		
	once for each direction		
MTBF Demonstration	50,000 hours with confidence level 90%	Note 1	Note 3

#### Note 1:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

#### Note 2:

Evaluation should be tested after storage at room temperature for one hour.

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#### Note 3:

The MTBF (Exclude CCFL) calculation is based on the assumption that the failure rate distribution meets the Exponential Model.

distribution meets the Exponential Model.

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### E. Safety

## (1) Sharp Edge Requirements

There will be no sharp edges or corners on the display assembly that could cause injury.

## (2) Materials

#### a. Toxicity

There will be no carcinogenic materials used anywhere in the display module. If toxic materials are used, they will be reviewed and approved by the responsible InnoLux Toxicologist.

#### b. Flammability

All components including electrical components that do not meet the flammability grade UL94-V1 in the module will complete the flammability rating exception approval process. The printed circuit board will be made from material rated 94-V1 or better. The actual UL flammability rating will be printed on the printed circuit board.

#### C. Capacitors

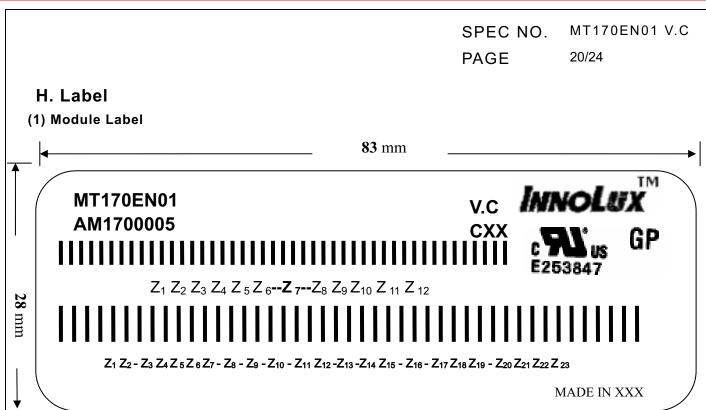
If any polarized capacitors are used in the display assembly, provisions will be made to keep them from being inserted backwards.

## F. Display quality

The display quality of the color TFT-LCD module should be in compliance with the Innolux's Incoming inspection standard.

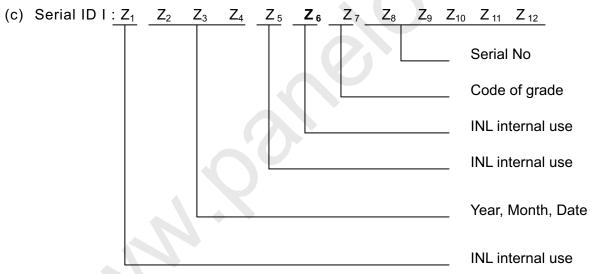
## G. Handling precaution

The Handling of the TFT-LCD should be in compliance with the Innolux's handling principle standard.



(a) Model Number: MT170EN01

(b) Version: V.C



Serial ID includes the information as below:

Manufactured Date: Year: 0~9, for 2000~2009.

2. Month: 1~9 & A~C for Jan.~Dec.

Date: 1~9 & A~Z (exclude I, O, Q, U) for 1th~31th. 3.

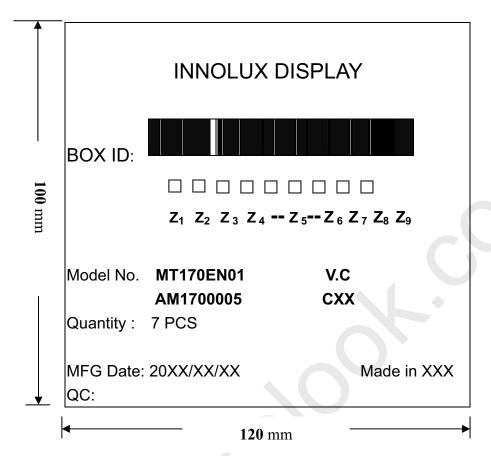
4. Code of grade: 1, 2,3, 5, 7, E

Serial No: Module manufacture sequential number.

(e) Serial ID II (INL internal use)

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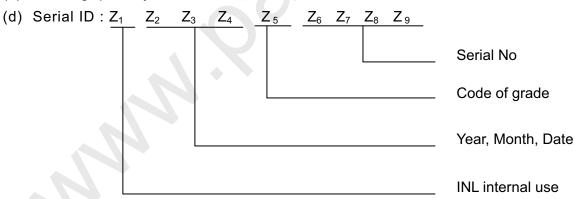
## (2) Carton Label



(a) Model Number: MT170EN01

(b) Version: V.C

(c) Packing quantity: 7 PCS



Serial ID includes the information as below:

(a) Manufactured Date: Year: 0~9, for 2000~2009

Month: 1~9 & A~C for Jan.~Dec.

Date: 1~9 & A~Z (exclude I, O, Q, U) for 1th~31th

(b) Code of grade: 1, 3, 5, 7, E

(c) Serial No: Module packing sequential number.

屏库:全球液晶屏交易中心

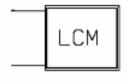
MT170EN01 V.C

**②** 

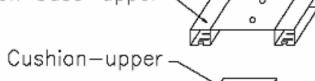
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# I. Packing form

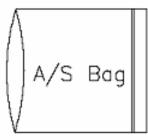


Cushion base-upper-

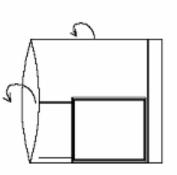


Step A

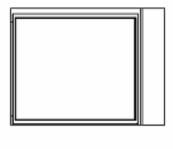
Put LCM into A/S bag



Step B Turn back A/S bag

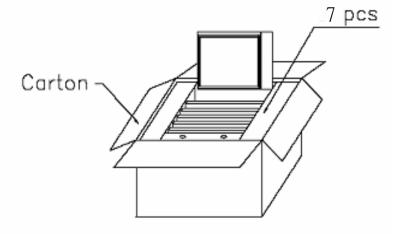


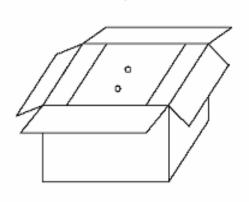




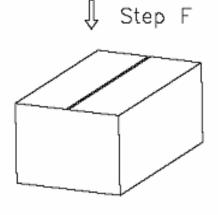
Step D

Put LCM with A/S bag into carton





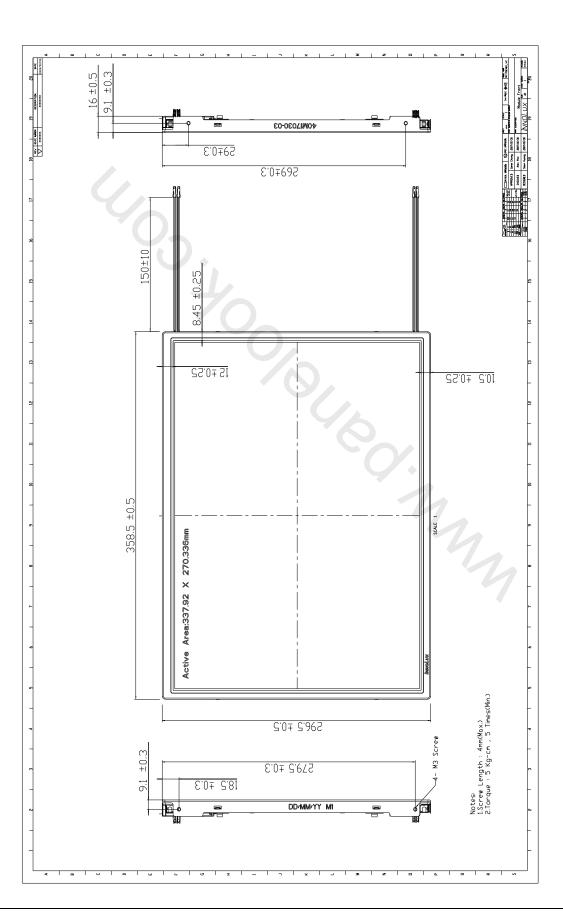
Step E



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PERMISSION FROM INNOLUX DISPLAY CORPORATION

## 1. Front View





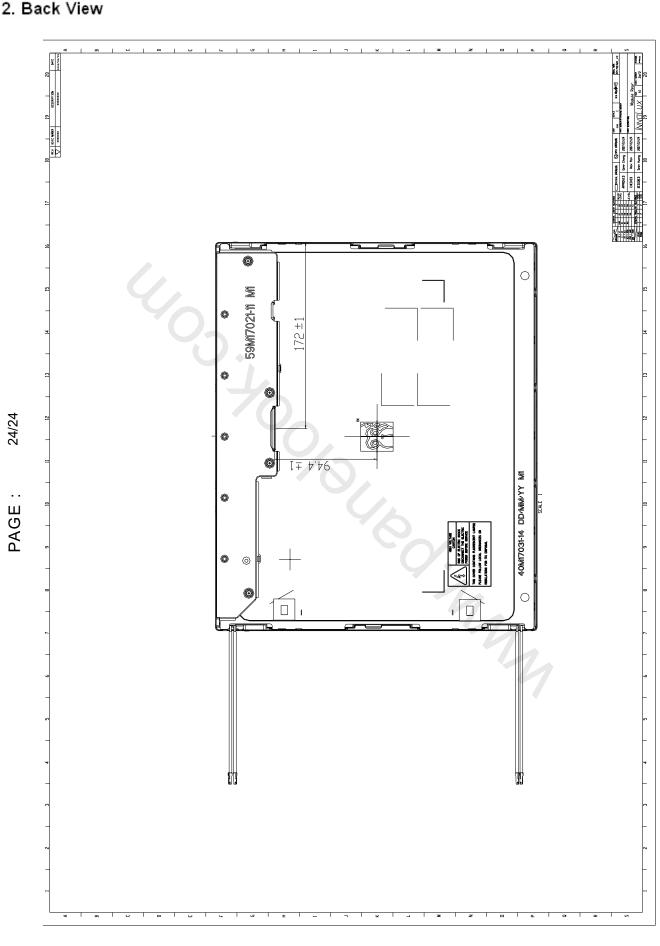


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